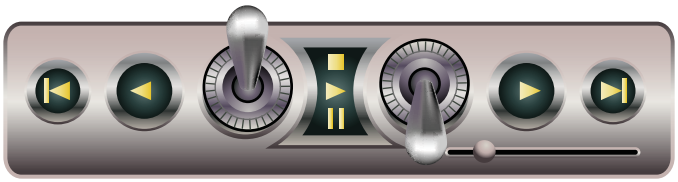
Flight Surgeon Refresher Course

Section 4: Aviation Safety

Aviation Protective Equipment (FSRC403)



AVIATION PROTECTIVE EQUIPMENT

Introduction

Proper wear and maintenance of aviation equipment while serving as an aircrew member will help reduce injuries and possibly save your life should you be involved in an aircraft accident.

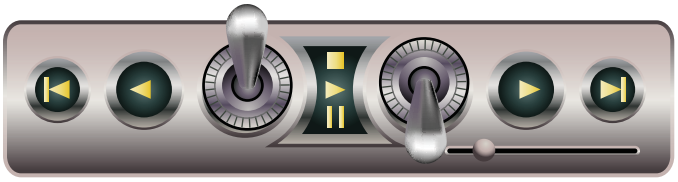
This lesson will review the proper use of aviation protective equipment. You will be able to maintain and wear this equipment in accordance with (IAW) the appropriate Army Regulations and Technical Manuals. Use these instructions as a self-checklist every time you wear flight equipment.

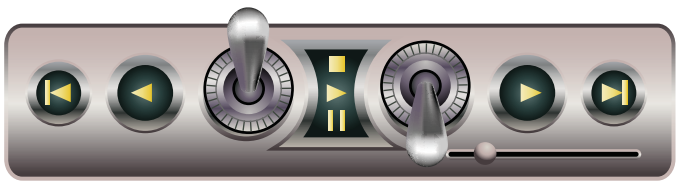
Objectives:

a. Discuss the use and care of aviation life support equipment in flight and the potential protections they provide

b. Identify the safety features provided by an aircraft

c. Describe the characteristics, proper use, and maintenance of flight apparel.





Aircraft Safety Features

Aircraft structural shell (fuselage)

- Cockpit and cabin: possess sufficient strength to prevent intrusion of structure in occupied spaces during a survivable crash.
- Floor and nose: designed to reduces plowing or scooping of earth during crashes, which could decrease stopping distances resulting in higher decelerative forces.

Landing gear and crash worthy seats

- Newer Army rotary wing aircraft (UH-60/AH-64) rely heavily on fixed landing gear and seats to attenuate crash forces.
- Fatalities are rare for vertical impacts up to approximately 15.2 meters per second (50 ft/sec).
- Maximum landing loads for the UH-60 is 540 ft/min (11.25g) under normal conditions.

Personnel restraint system

- To survive an impact, only to then be injured or killed due to ejection from the aircraft would be terrible.
- Studies indicate that contact injuries (secondary impacts) occur 5 times as often as acceleration injuries.
- Therefore personal restraints should be tight as to inhibit contact with objects in the cockpit, i.e. cyclic.
- Equipment should also be tied-down securely to prevent being thrown into crewmembers.

Post-crash factors

Protection from thermal injuries:

Crash worthy fuel systems Self sealing-fuel cells

Break free self-sealing fuel lines

Fire extinguishing systems in the engine compartment

Personal fire extinguishers in the cockpit (for personnel).

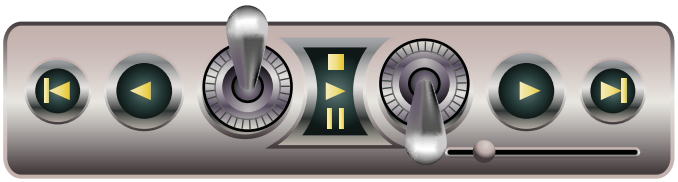
Protection from drowning:

Training of the crewmember (water survival training)

Special equipment (required during over water missions):

Personal flotation devices (water wings)

Rafts.



Flight Apparel

Why is it important to wear flight clothing properly?

- Proper wear of all aviation life support equipment must be established before the flight begins. If an emergency occurs the crewmember may either be too busy or have insufficient time to make corrective changes (especially if the aircraft is at a low altitude as in nap-of-the-earth flight).
- AR 95-1 states: “The following U.S. Army approved clothing and equipment will be worn by all crew members when performing crew duties: leather boots, flight helmet, flight suit, flight gloves, cotton, wool, or NOMEX underwear, and identification tags”.
- A functional aviation protective equipment ensemble is determined not only by proper care and maintenance techniques, but also by proper wear of the equipment.

NOTE: It is the crewmember's responsibility to directly exchange (DX) these items when material is worn, ripped, or damaged.

How to wear flight clothing properly:

Undergarments:

- Wear cotton, wool or NOMEX underwear when performing crew duties per AR 95-1.
- Most synthetic underwear fabrics melt at or below 350° and ignite at 450° and above!
- NOMEX is not fireproof and will char at about 700° to 800° F (370° to 430° C); therefore, proper ground egress procedures cannot be over emphasized.
- Improper use of these garments can produce heat exhaustion within thirty minutes of hard work.

WARNING: Nylon or other synthetic underwear will melt underneath the NOMEX, and cause life-threatening burns to the trunk and groin.

Identification tags:

- Required when flying.
- Avoid plastic covers/liners that could cause burns if the plastic melts.
- ID tag chain should be worn around outside of collar and tucked between blouse and T-shirt.

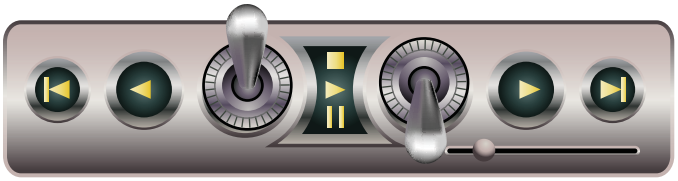
Boots:

- Must be all leather or approved for flight!
- Provide retention during high G-forces to include crash or ejection.
- Provide stability to prevent ankle and foot injury that could compromise aircraft escape.
- Provide fire retardancy.
  - Leather boots’ fire retardancy is greater than jungle boots.
  - The boots must be laced up fully to the top.

WARNING: Avoid boots with zippers, straps, and jungle boots. Zippers will transfer heat, straps will give or even break and jungle boots will melt.

NOMEX flight suits

- NOMEX flight suits (either the one piece, sage green or the Aviation Battle Dress Uniform) are flame resistant garments. The flame resistant properties are inherent of the polymer chemistry; it will not diminish during the life of the fiber. This flexible polymer chain gives NOMEX more textile-like qualities while retaining high temperature properties similar to KEVLAR.



CAUTION: Burns to the neck can occur during a flash fire if the collar is not worn up!

- Collar is one piece, which is worn up while flying
- Sleeves must be worn down and Velcro tabs secured during flight.

CAUTION: Pant legs should not rise above top of boot when sitting, to avoid injury from flash fires or flames!

- Uniform should be loose fitting to prevent thermal burns due to tightness. Size and fit should completely cover all skin not covered by gloves, helmet and boots. Best protection is provided by two layers of clothing (NOMEX over NOMEX, cotton, or wool).

CAUTION: Sleeves must be long enough to compensate for reach. The wrist must remain covered even when the arm is extended, to avoid injury from flash fires or flames!

NOMEX flight gloves

- Flight gloves are designed for comfort, insulation during a fire, and sensitivity to identify an object by touch.

Flight Suit Maintenance Procedures

Avoid wearing flight suit during routine ground duties due to possible contact with grease, oil, paint, glue, and other combustible materials.

This reduces fire retardancy and reduces breathing qualities of the garment.

Cleaning Flight Suits

Wash at temperatures less than 180 degrees, and rinse completely to remove soap film.

Fabric softeners may be used in the rinse cycle to remove body oils. The fabric softeners will also serve to inhibit static generation.

Do not use any type of bleaching compound in laundering

Do not starch. In the event that the uniform is inadvertently starched, restore the fire resistance to its original state by rinsing the garment in warm water.

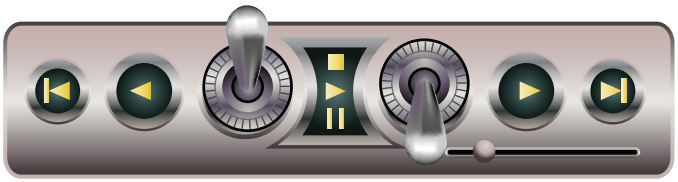
Drying temperature should not exceed 180 degrees.

Ironing on the Permanent Press setting, medium temperature, can be done, but do not iron the Velcro tabs.

Wrinkles, however, are hard to remove from NOMEX due to its high temperature resistant quality.

Commercial dry cleaning may be used.

The jackets and hood should be commercially dry cleaned only.



- Flight Gloves must be worn at all times during flight or when engaged in flight activities.
- Gloves are to be worn under the sleeves of the NOMEX flight suit. If a watch is worn, it should be worn outside of glove.

Washing NOMEX Flight Gloves

NOMEX flight gloves can be washed with mild soap and water while gloves are on your hands, or in a washer.

Washing temperature should not exceed 120°.

Do not bleach or starch.

Remove excess water by squeezing gloves or rolling them in towel.

Do not wring or twist.

Stretch gloves into shape and hang or lay flat to air dry.

Do not tumble dry, or expose wet gloves to heat or direct sunlight.

WARNING: When donning the helmet, ensure that the nape strap pad is completely pulled down and that the keeper tab is taut. Failure to do so will decrease helmet stability and may cause injury to the wearer.

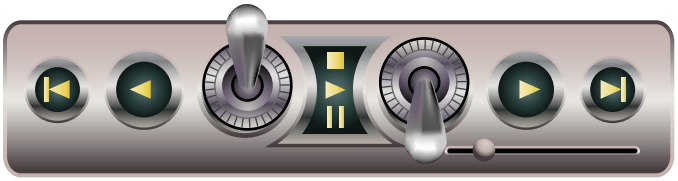
Flight helmets

Head Gear Unit-56P

- Replacement for the SPH-4B.
- Constructed of graphite and SPECTRA®--a thicker, less dense, energy absorbing liner. This helmet provides greater impact protection than previous helmets. Also has an upgraded retention system.
- Sound attenuation better than SPH-4B.
- May be custom fitted by an ALSE technician.
- Dual visors, comparable to the SPH-4B, and detachable face guard.
- Chin and nape pad/strap for better retention. Always ensure both are tight prior to flight.

CAUTION: When donning or removing helmet, spread helmet just enough to clear head. Excessive spreading may damage helmet. How to Wear Flight Helmets:

- Use visor except during night vision goggle flights or when using target acquisition equipment.
- Always ensure both chin and nape straps are tight prior to flight.
- Always wear the helmet with the chinstrap properly attached and adjusted. Failure to secure the chinstrap will decrease helmet stability and may cause injury to the wearer.
- Laser-protective visors are not intended to protect against broad-spectrum bright light. Do not use the laser-protective visors to view solar eclipses, electric welding equipment, or other potentially eye-damaging light sources.
- Proper fitting is essential to the effectiveness of the helmet, all of its modules, and consequently, the safety of the operator/ wearer.



Unsafe Apparel for Flight

Examples of unsafe apparel for air crewmembers:

- Metal jewelry and watches can be dangerous when working on the aircraft, near battery terminals, or exposed wiring connection.
- If you wear a watch, wear it over the gloved hand.

WARNING: Use of sunglasses does not substitute for visor during flight.

- Metal insignia can contribute to injuries during a crash sequence or due to electrical short circuits. Foreign objects damage can be caused by the fastener on back of the insignia. Insignia and badges on ABDUs will be sewn on.
- Issued sunglasses are for use during the day when night flight is anticipated. Glasses are not a substitute for visors.

Washing Flight Helmets

(SPH-4B and HGU-56P)

Clean outer helmet and visors with warm soapy water and soft cloth. Remove the TPL to clean the liner.

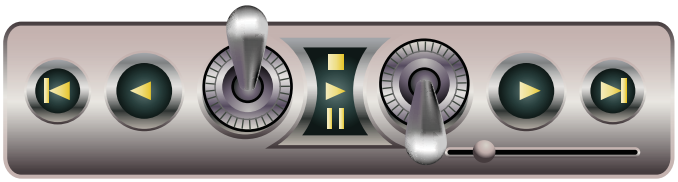
Modifications may be made only by ALSE technicians.

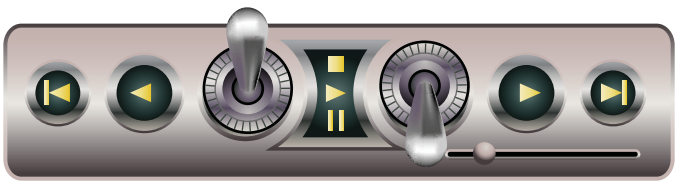
Inspect helmet, each time it is used, for loose or worn parts, frayed straps, and cracking of the outer shell.

Do not sit on helmet.

Do not place objects in the helmet that can damage the protective qualities of polystyrene lining and TPL.

CAUTION: Do not store helmet in a closed cockpit, an automobile, or any other area where temperatures can exceed 200° on an 85° day. Excessive heat will damage the thermoplastic liner (TPL).





US Army School of Aviation Medicine
301 Dustoff
Fort Rucker , AL 36362

334 • 255 • 7460
http://usasam.amedd.army.mil